



Statement of Work

Prepared for:

The Research Foundation for the State University of New York



Statement of Work for CTG-IHI Genomics and Medical Informatics Research Center

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STATEMENT OF WORK

This Statement of Work (or "SOW") is subject to the terms and conditions of the Master Agreement ("Agreement") between Computer Task Group, Inc. ("CTG") and The Research Foundation for the State University of New York ("Foundation") on behalf of the University at Buffalo of the State University of New York ("UB") (collectively, "The Parties"). The work described in this SOW is based on the Memorandum of Understanding between CTG and Foundation dated January 7, 2014 ("MOU").

1. Executive Summary

Under the leadership of Governor Andrew Cuomo, New York State has committed to fund programs that cover the entire spectrum of clean energy, medical, smart grid, and nanotechnology industry needs, from long-term innovative research and development, to workforce development and education, to product prototyping and commercialization. Governor Cuomo's comprehensive job creation and economic growth agenda provides strategic investments for job creation in emerging high-tech industries across the state and fosters critical partnerships between State government, the private sector, and New York State's top-flight universities and research institutions, as demonstrated recently by the commitment and growth of UB, together with its public and private university and industry partners. In support of that initiative, CTG and UB will collaborate to establish a sustainable community-wide asset through the organization and operationalization of healthcare data. "Community," in this sense, embraces the broad academic community, the medical research community, the commercial healthcare community, and most importantly, the healthcare consumer community. This SOW represents the tasks and approach to meet that vision.

CTG acknowledges that UB is critical to maintaining and bolstering New York State's position as a leader in healthcare data analytics. CTG recognizes the mutual benefit that can be attained by collaborating on new research, development, and business investments, and by fostering critical partnerships among the Parties and the public and private sectors. In this collaboration CTG will develop and deploy current and future life sciences innovations and solutions, including healthcare data analytics applications development and solutions.

Both UB and CTG intend to further build on their innovation, education, and commercialization skills and resources to further establish New York State as the global hub for life sciences and medical industry product discovery and deployment. The Parties desire to explore joint investments in the State of New York that focus on research and development (R&D) and commercial development of a sustainable asset through operationalization of healthcare data.

2. Objectives and Scope

This SOW outlines the tasks and costs required to initiate the establishment of the foundation of the community-wide data asset, as set forth in Section IV 1 i of the MOU. The first step includes establishing a research asset by duplicating certain portions of the production environment currently in place at CTG established and refined under the HEAL grants, within the IHI environment. This is expected to be completed by April 1, 2014. Following this, CTG will provide consulting services through December 31, 2014, to maintain and support the research asset as well as to support commercialization of the research asset.

The overall scope of this SOW follows, as further detailed in Section 2.1 below:

- Research Data Asset
 - Migrate HEAL database to IHI as research data asset
 - Migrate extract, transform, load (ETL) processes for research data asset to IHI
 - Services to maintain research data asset and ETLs during term of SOW
 - Services to support selection, access, and implementation of a toolset for access to research data asset
 - IHI-approved documentation and knowledge transfer for use/maintenance of research data asset and ETLs post-SOW
- Commercial Data Asset
 - Create commercial data asset and ETLs
 - Services to maintain commercial data asset and ETLs during term of SOW
 - Sustainability plan for commercial data asset and ETLs post-SOW
- Additional Tasks
 - MPI functionality for data assets including de-identification/re-identification services
 - Services to provide extensibility of ETL and data assets to include other data sources
 - Services to provide capability for bi-directional connection of data assets and MPI to the genomic data warehouse
 - Technical writing resource to support a total of four publications/grants
 - Services to facilitate monthly Medical Oversight Committee (MOC) meetings and bimonthly subject matter expert (SME) group meetings

2.1. Tasks

2.1.1. Establish Research Data Asset

The following tasks are expected to be completed by April 1, 2014:

- Task 1: Setup and configuration



- Create a research mirror ("Mirror") of the current production state (PROD) of the HEAL 17 asset now housed at CTG. This will establish a baseline information technology environment within the IHI compatible with the product of NY State's investment under the HEAL program. Crucially, it will also establish a functioning data communication pipeline between UB and CTG IT
 - Test the Mirror using CTG's analytic tools at both the Mirror and the CTG production site
 - Expand the Mirror from PROD to TEST, DEV (development), and data acquisition
 - Once DEV is functioning in the IHI environment, CTG can implement its data aggregation and data normalization software at the IHI
- Task 2: Deliver and install the following software at the IHI.
 - CTG Gold Standard Database The "Gold Standard" database makes it possible to combine large amounts of disparate data in a singular health data asset. Health data from claims, labs, and electronic medical records different but overlapping information, in varying formats. The Gold Standard maps data from multiple sources into a standardized schema and converts values to a consistent format. This supports comprehensive analytics of integrated claims data, lab results, and pharmaceutical data
 - CTG Reference Information Model (RIM) Codes are validated against CTG's database of industry-standard reference code sets, stored in the RIM. This database of standard reference values includes CPT, HCPS, ICD-9/10, NDC, LOINC, and NPI
 - Population of the CTG database with HEAL 10/17 data, for owners who provided consent satisfactory to UB
 - CTG Health Data Information Exchange Software (HIE). The HIE provides ETL capabilities and has the ability to import health-related data in various standard clinical file formats (e.g., HL7 version 2.5 for ADT and ORU, X 12 837I/P) or in flat files. The HIE supports an automated, end-to-end, data import process
 - CTG Pseudoanonymization Software. Pseudo-anonymization makes it possible to merge data sets for research and provides a continuum of care while maintaining autonomy of IDs for data providers. CTG's pseudo-anonymization procedure for patient and provider information uses a hash-based algorithm. These techniques support personalized medicine as well as provide for broad epidemiological studies of de-identified patients
 - Operationalization of four existing data feeds (IHA, ECMC, HealthNow, and UBMD) for owners that have provided consent and access

UB will be notified when CTG completes the delivery and installation of the above software at the IHI.

There will be a two-week acceptance and sign-off period for the IHI.

The consulting services set forth in sections 2.1.2 through 2.1.4 will be delivered on a time-and-materials basis from April 1, 2014, through December 31, 2014, subject to the fee arrangement set forth in Section 2.2.

2.1.2. Research Data Asset Support and Maintenance

- Task 1: Redesign database for merge of data
 - Develop Master Patient Index (MPI) Key to research usage and expansion to genomics



- Develop anonymous source identifier: One (source) to many (IDs) relationship to thwart backward identification
- Accommodation for ICD-9/ICD-10 stepped migration
- Task 2: Design and implement audit trails
 - Record of data feeds from all sources
 - Monitor everyone who touches the data every time
- Task 3: Design the big research data asset
 - Migrate from PostgreSQL to Oracle (for example), including database technology design changes, rewriting of analytics tools to accommodate Oracle SQL idiosyncrasies, and testing
 - Investigate academic community data sharing and IRB standards
- Task 4: Implement Mirror update procedures
 - Once the static Mirror is built, procedures to update the data and software on a regular or as-needed basis will be developed and implemented to capture new data feeds from providers and payers, software updates, and ad hoc bug fixes
 - Software updates may be infrastructure-related (e.g. new release of database), analysis-related, or security-related (e.g. patch for newly discovered vulnerability). The key here is to keep the Mirror and CTG in sync throughout the project.

2.1.3. Establish Commercial Data Asset

- Task 1: Redesign database for merge of data
 - Develop Master Patient Index (MPI)
 - Develop anonymous source identifier: One (source) to many (IDs) relationship to thwart backward identification
 - Accommodation for ICD-9/ICD-10 stepped migration
- Task 2: Design and implement audit trails
 - Record of data feeds from all sources
 - Monitor everyone who touches the data every time
- Task 3: Design the big commercial data asset
 - Migrate from PostgreSQL to Oracle (for example), including database technology design changes, rewriting of analytics tools to accommodate Oracle SQL idiosyncrasies, and testing
 - Enable data "sharing" according to competition agreements (this may lead to complicated software accessibility) "Original sourcing" may be an issue; e.g., data from insurer is shared with provider, which then sends it back to the system from the provider's EHR.
 - Investigate data governance (e.g., IRB, HIPAA, etc.)
- Task 4: Build the commercial data subset and implement update procedures
 - Once the static commercial data subset is built, procedures to update the data and software on a regular or as-needed basis will be developed and implemented to capture new data feeds from providers and payers, software updates, and ad hoc bug fixes



- Software updates may be infrastructure-related (e.g. new release of database), analysis-related, or security-related (e.g. patch for newly discovered vulnerability). The key here is to keep the Mirror and CTG in sync throughout the project.

2.1.4. Additional Tasks

- Task 1: Develop and document methods for data sources to join the community data asset (including the commercial and research data assets)
 - Develop a process for the addition of new data sources (research sources and commercial sources)
 - Design standard memorandum of understanding (MOU) template which allows for varying levels of participation (e.g. full sharing of pseudo-anonymous data), provides the ability to allow or decline re-identification for MPI purposes
- Task 2: Make the data assets available
 - Assist in publicizing capabilities and resources available in the community data asset
 - Services to support selection, access, and implementation of a toolset for access to data assets
 - ◆ Develop process (manual or automated) for researchers and other data users to receive data extracts
 - ◆ Establish data request process and/or tool
 - ◆ Develop query process (manual or automated) for prospective researchers and other data users in the design phase of their studies to inspect data samples or other preliminary files
 - Support and/or streamline IRB process for researchers
 - Services to maintain research and commercial data assets and ETLs during term of SOW
 - Services to provide extensibility of ETL and data assets to include other data sources
 - IHI-approved documentation and knowledge transfer for use/maintenance of data assets and ETLs post-SOW
 - ◆ Create end-user documentation for researchers and other data users describing what is available and how users can access the data and analytics in this community asset
 - Services to provide capability for bi-directional connection of data assets and MPI to the genomic data warehouse
 - Sustainability plan for commercial data asset and ETLs post-SOW
 - Technical writing resource to support a total of four publications/grants
 - Services to facilitate monthly MOC meetings and bimonthly SME meetings
 - Suggestions and consultation around integration of CTG software with other aspects of the UB software environment (e.g. integration with clinical trial software)

Sections 2.1.2 through 2.1.4 will be completed when the Section 2.2 funding limits have been reached

2.2. Consulting Services

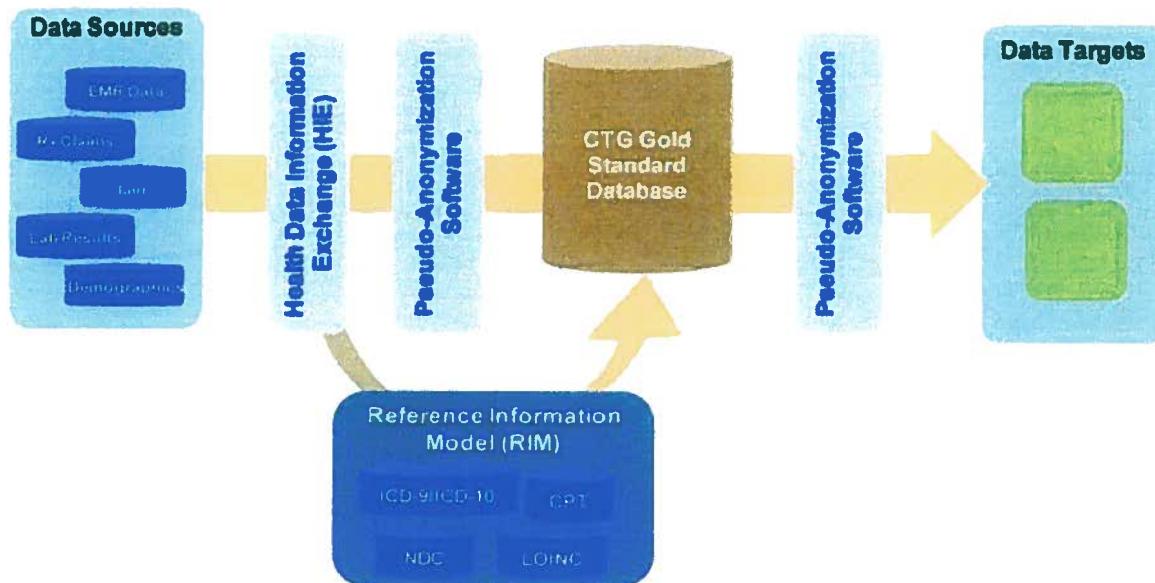
CTG will perform the services identified in Sections 2.1.2 through 2.1.4 on a time-and-materials basis, up to a maximum of [REDACTED] beginning in April 2014 and ending in December 2014.

Since the scope of these efforts is still under development, CTG will perform on a best efforts basis under the direction of the IHI Program Manager to deliver services until the [REDACTED] budget cap is reached. There are no expenses contemplated in this agreement. If any are considered they must be pre approved by Foundation

2.3. Licensing Costs

This SOW includes a perpetual (from document signing and continues indefinitely after all deliverables are completed that contemplated in this SOW) license for the following software see section 2.1.1 for software description:

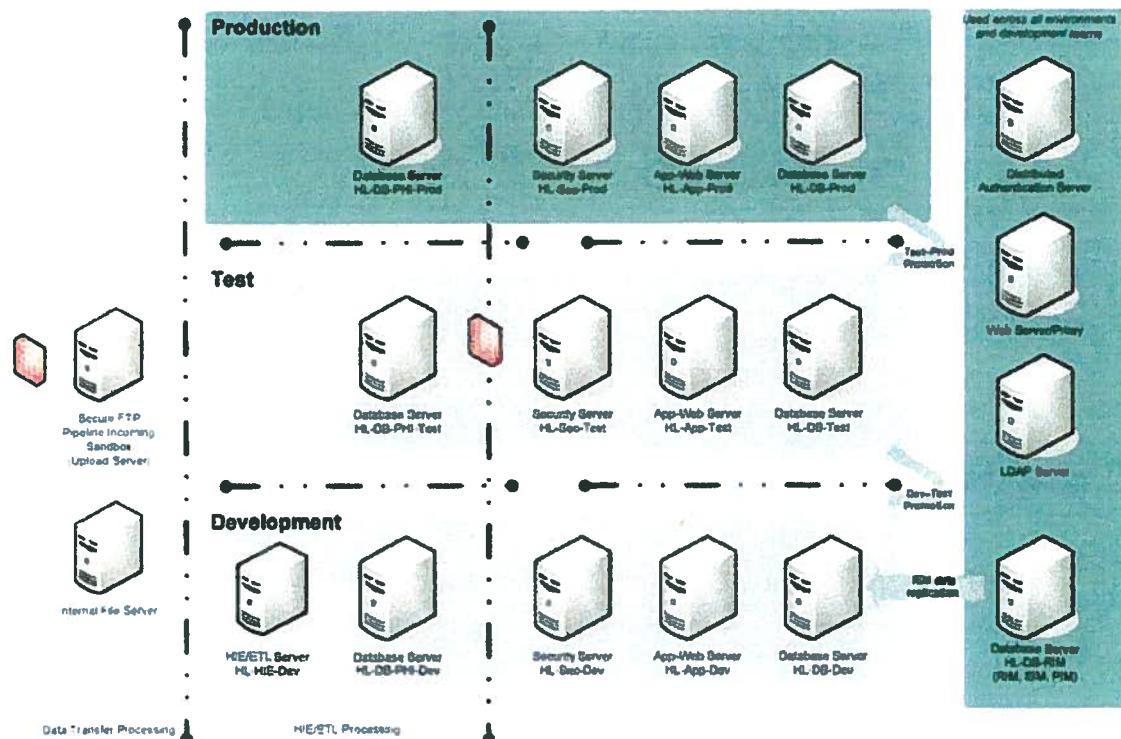
- CTG Reference Information Model (RIM)
- CTG Gold Standard Database
- CTG Health Data Information Exchange (HIE) Software
- CTG Pseudo-Anonymization Software



2.4. Hardware and Physical Devices

Foundation will provide all necessary hardware, physical devices, communications, and network security to achieve the goals of this SOW.

The CTG-IHI Genomics and Medical Informatics Research Center responsibilities included within the scope of this SOW are shown in green in the following graphic.



3. Assumptions

The price and schedule set forth in this SOW are based upon the following assumptions. Any deviations from these assumptions for reasons not within the control of CTG may affect price and schedule, and will be addressed under the change management process.

The following major assumptions are critical to the success of the project:

- Enhancements outside the scope of this SOW will be handled through a change management process.
- This project requires a tightly controlled collaborative effort between Foundation and CTG on all deliverables and communications.

- Foundation will appoint a program manager for the project who will provide executive program direction and resolution of all project level issues as needed.
- Engagement of major participants (ECMC, IHA, HN, UBMD) must start as soon as March 1, 2014.
- Computing infrastructure must be ready by March 15, 2014.
- Critical Foundation clinical and project participants will actively participate in regular project status review and issue resolution sessions.
- Any scope changes will be pre-approved by both parties. Any project issues will be resolved in a collaborative manner.
- As stated in the MOU, Foundation commits to establishing an asset that includes computing power, a HIPAA-compliant data center and environment, and adequate disk space to store data estimated at 10TB.

4. Schedule

The research data asset is expected to be completed by April 1, 2014, based on a February 1, 2014, start date. UB will be notified when CTG completes the delivery and installation of the above software at the IHI. Foundation agrees to diligently review and accept installation of the research data asset. There will be a two-week acceptance and sign-off period for the IHI.

We will commence licensing on April 1, 2014.

The term of this SOW will commence upon execution and be completed on December 31, 2014, as set forth in Section 2.2.

5. Price and Payment

The firm fixed price of [REDACTED] includes a software license as set forth in Section 2.3 above and consulting services as set forth in Section 2.2 above.

Item	Amount
License fees	[REDACTED]
Consulting services, April 1–December 31, 2014	\$ [REDACTED]
TOTAL	\$ [REDACTED]

CTG will invoice for the license fees on April 1, 2014.

CTG will invoice for consulting services on a monthly basis at the resource rates charged by CTG under the HEAL 10 Quality Report SOW dated May 9, 2012, and the HEAL 17 SOW dated May 9, 2012.



Foundation shall not be obligated to make payments to CTG until the budget that this SOW is predicated upon is approved by New York State (expected in March 2014). CTG shall not be obligated to continue to perform services if in its sole judgment it determines that NYS approval will be withheld.

CTG additionally agrees to provide in-kind contributions to this effort in the amount of [REDACTED]. These in-kind contributions will be made consistent with the rules for contributions CTG made during the HEAL 10 and HEAL 17 projects. As such CTG will contribute a perpetual, limited use, non-exclusive license to its proprietary methodology CTG – Exemplar used to integrate clinical data and configure clinical systems. CTG – Exemplar is necessary for implementing the efforts contemplated in this SOW as well as ongoing needs for the IHI as it integrates clinical systems with electronic health records. CTG has been developing and using this methodology in a proprietary manner on [REDACTED] worth of engagements over the past 10 years. The methodology has significantly contributed to CTG achieving some of the highest quality scores in the industry. CTG has licensed this methodology in very unique circumstances where CTG has developed a tight partnership with an entity. We have licensed the CTG – Exemplar clinical systems method alone for \$[REDACTED] to assist a partner implementing a series of very complex clinical system engagements. Contribution of this license to UB-IHI is perpetual, non exclusive and for internal UB purposes and will be complete when the methodology is delivered to UB-IHI. No periodic updates or maintenance of the methodology are necessary and therefore are not included as part of this agreement.

6. Additional Terms and Conditions

Rights in Data

Notwithstanding anything to the contrary in the Agreement, CTG shall retain all right, title, and interest in and to the intellectual property used, created, and/or delivered by CTG in the performance of this Statement of Work. Foundation shall have a non-transferable, non-exclusive perpetual right to use such intellectual property for research purposes at UB under the scope of the Institute for Healthcare Informatics.

Reporting

CTG will participate in the reporting of employment numbers over the next five years consistent with the reporting CTG has been performing for UB on behalf of its NYS sponsors since 2009.

Collaboration

CTG will continue to collaborate on ideas and opportunities with the objective of creating 300 jobs in NY identified in the MOU between CTG and Foundation.



Approvals

This Statement of Work will become effective only upon signature below by representatives of each party hereto

Computer Task Group, Inc.		Research Foundation for the State University of New York	
Name:	Michael Colson	Name:	Alexander N. Cartwright
Signature:		Signature:	
Senior Vice President, IT Solutions		Vice President for Research and Economic Development	
Title:		Title:	
Date:	April 15 2014	Date:	5/2/14